AMENDMENTS TO THE SPECIFICATION: identifying insertions and ~~deletions~~.

Please amend paragraph [0005] at page 2 as follows:

[0005] When two lithographic apparatuses are used simultaneously, this implies that there may be several patterning structures available containing the pattern to be applied to a given layer. The several patterning structures may also differ due to production tolerances. These differences may lead to differences in the images applied to the substrate or in differences of the positions on the substrates where the images are applied.

Please amend paragraph [0006] at page 2 as follows:

[0006] Commonly the substrates are marked with a code which is scratched into the substrate. With these codes the substrates can be identified. The relation between the identities of the substrates and the lithographic apparatuses or the patterning structures used to project images onto the substrate is stored. The combination of the stored relations and the identity of the substrates can be used to correct for the differences, based upon knowledge of the previously used lithographic apparatus or patterning structure.

Please amend paragraph [0008] at page 2 as follows:

[0008] On top of that, the space used ~~by~~ for a code is not available for placing integrated circuits. Many steps during the production of an integrated circuit are less expensive per integrated circuit or faster per integrated circuit when more integrated circuits ~~fit~~ are placed on one substrate, ~~(~~without increasing the size of the substrate~~)~~. Therefore the production costs can be decreased and the throughput can be increased by freeing space on the substrate for extra integrated circuits and refraining from reserving space of codes.

Please amend paragraph [0059] at page 12 as follows:

[0059] For substrate W1 the distance dxP1toP2@W1 along the x-axis between the position of the substrate reference mark P2@W1 and the substrate alignment mark P1@W1 is calculated by the identification unit IU (figure 1) using

$$dxP1toP2@W1 = xP1@W1 - xP2@W1$$

and stored as a first memory entry in the second memory unit MEM2 (figure 1) which identifies substrate W1.

Please amend paragraph [0060] at page 12 as follows:

[0060] For substrate W2 the distance dxP1toP2@W2 along the x-axis between the position of the substrate reference mark P2@W2 and the substrate alignment mark P1@W2 is calculated by the identification unit IU using

$$dxP1toP2@W2 = xP1@W2 - xP2@W2$$

and stored in a second memory entry in the second memory unit MEM2, which identifies substrate W2.

Please amend paragraph [0066] at page 13 as follows:

[0066] At least some embodiments of the invention can be used to correct for differences to the engineered status of the substrates. For example, the first circuit pattern CP1@W1 on substrate W1 is formed by projecting the image of the first circuit pattern CP1@MA1 on patterning structure MA1 onto substrate W1 via a first lithographic apparatus LA1. The first circuit pattern CP1@W2 on substrate W2 is formed by projecting the image of the first circuit pattern CP1@MA1 on patterning structure MA1 onto substrate W2 via a second lithographic apparatus LA2. Due to an error in second lithographic apparatus LA2, the relative position of the first circuit pattern CP1@W2 on substrate W2 and substrate reference mark P2@W2 is not as defined in the corresponding memory. The error in second lithographic apparatus LA2 is known from a previous measurement and this information is shared with the first lithographic apparatus LA1.

Please amend paragraph [0068] at page 14 as follows:

[0068] At least some embodiments of the invention can be provided with a device or other structure to take into account the position and/or measurement errors associated with substrate alignment mark P1 and substrate reference mark P2. The defined position of the x co-ordinate xP2@W of the substrate reference mark is equal for both substrates W1,W2. The defined position of the x co-ordinate xP1@W1 of the substrate alignment mark on substrate W1 differs from the defined position of the x co-ordinate xP1@W2 of the substrate alignment mark on substrate W2. Apart from these defined differences, in practice errors will also occur.

The relative distance dxP1toP2@W1 from substrate alignment mark P1 to substrate reference mark P2 on substrate W1 as measured can be expressed as

$$rdxP1toP2@W1 = dxP1toP2@W1 + pe1 + me1,$$

where pe1 is a position error and me1 is a measurement error (see figure 6). An example of a position error is the error made in the distance between the circuit pattern CP1@MA1 on patterning structure MA1 and of the reference mark P2@MA1 during production of the patterning structure MA1. As explained the lithographic apparatus may image the circuit pattern CP1@MA1, reference mark P2@MA1 and/or alignment mark P1@MA1 separately. Where in practice the image of the circuit pattern CP1@MA1 is applied to each target portion C (figure 1) on substrate W1 only ~~1~~ one image of reference mark P2@MA1 and ~~1~~ one image of alignment mark P1@MA1 is applied to substrate W1. The imaging is done using information on the relative positions on patterning structure MA1 and the defined positions on substrate W1.

Please amend paragraph [0069] at page 14 as follows:

[0069] In the event the relative distance between reference mark P2@MA1 and circuit pattern CP1@MA1 on the patterning structure MA1 is not measured and accounted for during the steps of imaging the reference mark P2@MA1 and the circuit pattern CP1@MA1 onto substrate W1, the relative distance rdxCP1toP2@W1 may not be equal to dxCP1toP2@W1.

Please amend paragraph [0072] at page 15 as follows:

[0072] Both measured relative distances rdxP1toP2@W1 and rdxP1toP2@W2 may contain error terms. Identification unit IU compares the measured distance wD to the defined distances dxP1toP2@W1 and dxP1toP2@W2 between substrate alignment mark P1 and substrate reference mark on substrate W1 and substrate W2. It is possible that none of the defined distances dxP1toP2@W1 and dxP1toP2@W2 will be equal to the measured distance wD. Identification unit IU will determine the difference between the measured distance wD and each of the defined distances. The defined distance with the smallest difference to the measured distance wD may be selected as identifying the substrate. In the event |wD-dxP1toP2@W1|<|wD-dxP1toP2@W2| the identification unit IU will identify the substrate as substrate W1. In the event that |wD- dxP1toP2@W1| > |wD-dxP1toP2@W2|, the identification unit IU will identify the substrate as substrate W2.

Please amend paragraph [0073] at page 15 as follows:

[0073] On the second substrate W2 the defined position of the x co-ordinate xCP1@W1 for the first circuit pattern is equal to that on substrate W1. On the second substrate W2 the defined position of the x co-ordinate xP2@W2 is also equal to that on substrate W1 ~~also~~. On both substrates W1,W2 the position of the first circuit pattern CP1@W1, CP1@W2 can be determined by measuring the x co-ordinate xP2@W1, xP2@W2 of the substrate reference mark and accounting for the defined relative positions of the first circuit pattern CP1@W1, CP1@W2 and the substrate reference mark P2@W1, P2@W2. This distance will be referred to as dCP1toP2@W. The relation is

$$\text{xCP1@W} = \text{xP2@W} + \text{dCP1toP2@W}. \qquad (1)$$

Please amend paragraph [0075] at page 16 as follows:

[0075] On the processed substrate W1 the distance will be referred to as rdCP1toP2@W1. The relation with the defined distance dCP1toP2@W is

$$\text{rdCP1toP2@W1} = \text{dCP1toP2@W}\underline{1} + \varepsilon 1. \qquad (2)$$

Please amend paragraph [0078] at page 16 as follows:

[0078] Likewise ~~the~~ on substrate W2, defined distance between first circuit pattern CP1@W2 on substrate W2 and substrate alignment mark P1@W2 will be dCP1toP1@W2 and the realised distance will be rdCP1toP1@W2. The relation can be expressed as

$$\text{rdCP1toP1@W2} = \text{dCP1toP1@W2} + \delta 2, \qquad (4)$$

wherein $\delta 2$ is a position error similar to position errors $\varepsilon 1$ and $\delta 1$.

Please amend paragraph [0079] at page 16 as follows:

[0079] The measured x co-ordinate xP2@W1 of substrate reference mark P2@W1 can be expected to be at

$$\text{xP2@W1} = \text{xP2@W}\underline{1} + \xi 1. \qquad (5)$$

Please amend paragraph [0083] at page 16 as follows:

[0083] Once both the substrate reference mark P2@W1 and the substrate alignment mark P1@W1 are formed on the substrate W1 and ~~the~~ substrate W1 is developed, both their

positions can be read and can be used to determine the position of the first circuit pattern CP1@W1 on substrate W1.

Please amend paragraph [0084] at pages 16 and 17 as follows:

[0084] The position of the first circuit pattern on substrate W1 can be estimated from

$$xCP1@W1 = xP2@W1 + dCP1toP2@W\underline{1}. \quad (7)$$

Note that here the defined distance between CP1toP2@W<u>1</u> is used instead of the realised distance, since the realised position of first circuit pattern xcp1@w1 can not be measured.

Please amend paragraph [0085] at page 17 as follows:

[0085] The position of first circuit pattern on substrate W2 can be derived from

$$xCP1@W2 = xP2@W2 + dCP1toP2@W\underline{2}. \quad (8)$$

Please amend paragraph [0086] at page 17 as follows:

[0086] The position of the first circuit pattern CP1@W1 on substrate W1 can also be estimated from a measured position of substrate alignment mark P1@W1. This can be done via

$$xCP1@W1 = xP1@W1 + dCP1toP1@W\underline{1.} \quad (9)$$

Please amend paragraph [0087] at page 17 as follows:

[0087] For substrate W2 the position of the first circuit pattern CP1@W2 can be estimated via

$$xCP1@W2 = xP1@W2 + dCP1toP1@W\underline{2}. \quad (10)$$

Please amend paragraph [0088] at page 17 as follows:

[0088] After identification of the substrate, it is known if the substrate contains substrate alignment mark P1@W1 or P1@W2, i.e. if the substrate is substrate W1 or substrate W2. In the event the substrate is substrate W1, the position of the first circuit pattern can be estimated using either the measured position of the substrate reference mark (formula 7) or the measured position of the substrate alignment mark (formula 9). The estimation can also use the measured position of both the substrate reference mark and the measured position of

the substrate alignment mark in order to reduce the error terms. The effect of adding the two estimations of formula 7 and 9 and dividing the result by 2 is

xCP1@W1 = (xP2@W1 + dCP1toP2@W1 + xP1@W1 + dCP1toP1@W)/2. (11)

Please amend paragraph [0089] at page 17 as follows:

[0089] Filling in formula 5,2,6 and 3 clarifies how the errors translate into the estimated xCP1@W1

xCP1@W1 = (xP2@W1+ξ1+rdCP1toP2@W1-ε1 + xP1@W1+ζ1-+rdCP1toP1@W1+δ1)/2. (12)

Please amend paragraph [0094] at page 18 as follows:

[0094] It will be clear to a person skilled in the art, that any feature on the substrate or of the substrate of which the position can be determined, could replace the substrate reference mark. It will be clear to a person skilled in the art, that the relative positions of the substrate reference marks and the substrate alignment marks may indicate or contain information characterising the substrate such as a date, a serial number processing information or factory information. It may also be the number of substrates within a series with the same characteristics. Together with the serial number, for instance 7, the number of substrates within a series of for instance 9 substrates would indicate that it concerns substrate number 7 of 9 substrates. In all these cases, this characterising information regarding the substrate may be encoded in the relative positions. The characterising information regarding the substrate can be decoded ~~only~~ with a known relation between the relative positions and the characterising information corresponding to certain relative positions. It will be understood that the characterising information regarding the substrate such as date, serial number, processing information or factory information can be considered to identify a substrate or set of substrates.

Please amend paragraph [0095] at pages 18 and 19 as follows:

[0095] It will be clear to a person skilled in the art, that the characterising information may be used to calibrate the lithographic apparatus. For instance, the identity of a calibration substrate may be associated with height information such as the difference in height between two positions on the substrate (x1,y1,z1),(x2,y2,z2) (not shown). Differences in height are distances along the z-axis (figure 1). The measured distance is compared with a previously

measured distance according to the characterising information. The ratio between the previously measured distance and the measured distance can be used as a calibration ratio. Multiplying measured z-co-ordinates on the calibration substrate with the calibration ratio will result in calibrated z-co-ordinates. In other words, the lithographic apparatus is calibrated.